# The American Biology Teacher

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# THE AMERICAN BIOLOGY TEACHER

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# The American Biology Teacher

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# The Role of Biology in Conservation Education[1]

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Probably everyone has heard the comment of some enthusiastic American to the effect that this is the richest of all the continents and that our country possesses within its limits greater abundance and variety of natural resources than can be found together in any other part of the earth's surface. The statement is in a sense true. Yet it is the utilization of resources rather than their mere existence which gives them value and contributes to the welfare of their possessors.

The conquest of the wilderness was difficult and during the first years of settlement the margin between success and failure was very narrow. Not until a hundred years had elapsed did the richness of the country begin to show itself. About that time the primitive pursuit of agriculture had in places become less successful and throngs of new comers added to the pressure for space and opportunity. The continent was vast, and as one region became less profitable it was easy to find new places where the untouched soil yielded bountiful crops. It is not difficult to see that the throng ever moving westward left behind areas of mined out farm soils. A fundamental natural resource was being exhausted.

Consider for a moment the four great natural resources—water, soil, plant life and animal life—which in some measure can be controlled by man, and the one often unrecognized and entirely uncontrolled resource—climate. The prosperity of the present is drawn from the use of these resources and the hopes of the future depend on their wise utilization today. We are accustomed to speak of these natural resources as if they were separate and unrelated. Yet in fact they form in nature a single complex with the different parts so intimately related that contacts and changes at any single point

[1] Address before The National Association of Biology Teachers, Columbus, Ohio, December 29, 1939.

bring about inevitably changes at other points. Greater emphasis must be laid on this interrelation.

Water is for us the most fundamental of natural resources. Without it life cannot exist. Through its action the soil is built up with the aid of other agents but only so long as its supply persists. When contaminated water destroys life and when uncontrolled it carries away the soil and destroys the value of land. The process of soil construction is infinitely slow in human time but destruction may proceed with great rapidity.

Life is the latest product in the natural resources. Here the complexity and variety as well as the delicacy and intimacy of the interrelations of living things force themselves on the mind of the casual observer as well as the student. The more carefully one watches and studies the more complex as well as pervasive appears the balance of nature. The whole cannot be reproduced by putting together separate descriptions of its parts, however satisfactory they may be in their own fields. Biology is the life science and as a factor in education cannot confine itself to any one type of life or fail to give first place to the relations of life to environment. How inadequate is the study of life that fails to consider those factors which reduce the value of life or hasten its destruction!

Conservation is a word to conjure with at the present time. Our newspapers are full of it. Public speakers use it on every occasion. Everything that any interest seeks to promote is justified in its appeal for public consideration on the basis that the project is, in one way or another, conservation. No idea is too new and no plan is too erratic to be labelled an aspect of this new doctrine. We find also commercial interests now using it in advertising as the basis of a new and powerful appeal. In education standard texts give the subject scant consideration. References when found are confined to a sentence or paragraph at most.

The term conservation in its more restricted sense concerns immediately the natural resources of which man makes use for his advantage. In the larger sense it involves studies in social and political relations, health and disease, and all that concerns human society. It may be spoken of as human ecology, a recent term which has not been in use long enough to call up a clear picture in the average mind. Rightly understood conservation connotes the concept of balance between all the factors involved in life and environment. Man is, in a primitive and immediate fashion, related to his environment, depends upon it for his support and from it secures the comforts as well as the necessities of existence.

The fundamental importance of conservation demands that it receive primary consideration in the educational system today. The production of an intelligent public opinion which is to influence legislation rightly, cannot wisely be entrusted to state or federal bureaus or to any private groups, however well-informed and altruistic they may be. The myopic vision of individual or group interests is too well recognized to call for special comment.

Public opinion in the long run will be more intelligent and impartial than any other authority. If conservation is to be built into the mind of America, it must be taught in the public school system. And one may then ask at what place and in what way. Today no one seems inclined to limit the subject to any special point in the educational program. The

discussion centers about the manner of its presentation and its proper adjustment to different age levels.

Some would organize the work in a separate course and seek its introduction into the curriculum alongside of other subjects like mathematics, history or languages. Others have promoted its consideration by societies or clubs. Either solution has certain advantages and also encounters evident difficulties. But neither plan reaches the number of individuals essential for the development of a strong public opinion.

A plan which is somewhat widely supported at present proposes the preparation of units on conservation, embracing parts of courses now established. As some propose, these units are to be set into the curriculum at appropriate places in topics already placed in the schedule of the school. This proposal has one great advantage over those cited above in that it provides wider influence and brings conservation ultimately into many fields of study where its consideration is important. Nevertheless I find it difficult to see how conservation could be treated wisely or effectively as any discrete section of a subject. It looks to me like a method of treatment, a point of view, or a pervading influence. If now conservation must be handled as a unit to which is to be assigned a month, a week, or even a day, it must fight in every subject with the plans and prejudices of the individual teachers and would be apt to be limited to the single day rather than receive adequate time.

Furthermore, take botany for example: Conservation is more than a separate topic. It concerns forests, grasses, relations to soil, water and other growth conditions, to the struggle between different kinds of plants, and indeed, to nearly every phase of the subject. Any attempt to pack it into a separate period, long or short, would fail to show the significance it really has and to give it the proper appeal it ought to receive for the sake of the student and the subject as well. And to me this view applies not only to biology but equally to other branches of natural science as well as to geography, economics, history and all other fields which deal with life in any way.

However, an approved unit of any core curriculum or of an established course of study in the public school system of any area may be modified or reinterpreted by the addition of data, experiments, field work, or otherwise so as to emphasize the point of view of conservation. Nothing better could be done if no disturbance of the officially accepted program is involved, for our objective has been secured without argument.

Formal education has long regarded biology as a field of primary importance. However in the development of the educational program we have unfortunately lost sight of the fact that rightly this is the study of life itself. The major part of so-called biological courses in the present educational program are devoted to the memorizing of names, the classifications of types, the examination of details in structure, which as a rule are studied from a collection of dried plants or alcoholized specimens, rather than from contact with the living organisms in their natural environment. It is nearly a hundred years since Louis Agassiz, an educational pioneer in America, emphasized the importance of contact with *life* and set as the leading principle of his educational program, "Study nature, not books." The general response to that appeal led at that date to the wide spread teaching of what was rightly called natural history, but since then

school programs have gradually become more and more limited to the examination of museum material and the neglect of those living relations which after all are of primary importance. We must restore life to its proper place in the study of biology.

A superficial survey of the present educational program from the first to the twentieth grade discloses some interesting facts. In the elementary grades nature study has been fairly widely introduced, giving the pupil contact with life at the start of his educational influence. This result has been due in good part to the pioneer work of Mrs. Anna Botsford Comstock at Cornell who aroused an active interest which still persists at Cornell and which has penetrated far into the educational program of the country.

In the intermediate grades formal instruction in biology is local or occasional. Boy Scout and Girl Scout work brings in pupils of this age group in some cities, and 4H Club work attracts a good many in rural communities.

In the high school period courses in biology or any part of it are unfortunately less frequent than they were some 20 years ago. Those which are given appear too often to be merely weak copies of the courses the teachers had in college some years previously. The better courses are aided by the work of school clubs but these rarely prosper where the sciences are poorly presented in regular courses, and the total enrolment in clubs is small in comparison to the size of the school. Numerous exceptions may be found to the general picture just sketched. Yet I feel that I have represented average conditions, and that high school work in all biological lines is weaker than it was in 1900. Perhaps the decline has passed its low point and the future will show a steady gain. Certainly that ought to be the future of high school biology.

The situation in normal schools and colleges is extremely confused, both as to the amount of college biology given and as to the character of the courses themselves. I have been impressed by the number of teachers reported as awake to the importance of the conservation movement and their efforts to cooperate in offering work along this line. Yet I have been more impressed by such activity in the field of geography than of biology. But the data are limited and any conclusions from them dangerous.

The publication this past summer of a report on teaching botany prepared by a large group of college teachers in that subject betrays an astonishing situation. In a table based on an analysis of 257 questionnaires and summarizing the importance of objectives the relation of plants to the conservation of natural resources takes rank as No. 41; and in another table recording the emphasis given to various areas of content the same subject is given the same rank. The text of the report points out specifically: "One factor that has operated to influence content is that of specialization. Botany teachers come from the Ph.D. training as taxonomists, morphologists, geneticists, cytologists, algologists, physiologists and pathologists. It would be ridiculous to claim that such specialization has no influence upon what they teach." And again that report states, "Available text books likewise play a part in determining the pattern of content."

Now this report has been selected because it is the only thoroughly prosecuted, critical analysis of college and university teaching which has been made

of any biological subject in American institutions. Probably conditions in zoology are approximately the same, and from my own experience I should not be able to point out any radical differences. In one particular the findings recorded might be expected. Textbooks naturally lag behind in reporting changes and new lines of work. One teacher in biology who was most helpful in criticising constructively the report of a small committee with which I am connected made the frank appeal, "Do replace our text books first thing by some that are up-to-date." I have already mentioned the fact that high school texts are barren sources of material on conservation, and college books planned for use in a general course are at least equally poor. This is clearly one of the greatest obstacles to the introduction of work on conservation in schools of all grades.

But the teacher is not without helps, for bibliographic lists of useful books on conservation have been published by many agencies and if there is a demand for such aids even better lists can be furnished in short order.

A reader on conservation is being prepared by an able group of Canadian biologists for use in the schools of Ontario and its appearance is promised in the near future. This is another valuable aid for teachers in biology who wish to lay some emphasis on conservation.

Some states have well-organized nonpolitical departments of conservation and have sought to integrate their work with that of the state department of public instruction. The pamphlets issued by such states are valuable aids for other commonwealths. Various national societies devoted to different aspects of conservation issue publications which are available to all at modest prices. I cannot refrain here from recording my regret at the current tendency to demand all sorts of publications for nothing. Too much of the material obtained gratis is circulated with a concealed objective which impairs its usefulness in public education.

Our teacher training institutions are awakening to the needs and possibilities of the conservation movement. A few such institutions are already offering advice and training that has been well planned and publishing material which will aid teachers everywhere.

A potent factor in the development of a correct attitude and improved methods of teaching is the work of scientific societies. Under the leadership of its General Secretary, Dr. Otis W. Caldwell, the American Association for the Advancement of Science has for years devoted special attention to the study of problems in science teaching. Out of this has grown the American Science Teachers Association which, as an affiliated society with programs annually, is well known to scientific men. It has exercised conspicuous influence in calling attention to outstanding problems in science and their relations to science in education. Of like character and value is the National Association of Biology Teachers. But these are only a few of the many movements which might be cited in this connection. Not all of them are directly biological nor do all of them by any means name conservation in their presentations. But the alert student and the thoughtful teacher will find items which throw light on the proper readjustments of man's habits and practices to life and to his environment—and after all that is conservation.

Although the unity of science is clear and natural resources are closely interwoven, still conservation is in essence a

study of life in all its relations and the development of the subject is thus primarily a part of biology and of all the biological sciences in the broadest sense. Teachers in biology in secondary schools and in institutions of higher learning must recognize this obligation. A reform in introductory courses planned for the general student would seem to be clearly demanded at the present time.

# Full Color Projection of Microscope Slides

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Since my last communication,[1] we have done some experimenting in our laboratory that may prove of value to the biology teacher using projection apparatus for still shots.

The presentation of material in full color has always been considered the ideal method when using projection apparatus, but it has been only in recent years that natural color photography has been made possible by the advent of the so-called color film. Heretofore, color has been possible only in hand tinted slides, and, in most cases, the expense of these has been prohibitive. Even with the best hand tinting it is difficult to obtain perfect color rendition in either a print or a lantern slide. Color film has changed all this, and, now, the more advanced amateur can produce perfect color slides.

In checking through my file of "The American Biology Teacher" I find that not a few articles on teaching techniques have been devoted to the problem of making the students see what is so obvious to us as teachers. This is especially true when microscopic study is used, even when a sufficient number of microscopes is available for the use of everyone in the class. When only one or two microscopes are available, some supplementary technique must be used.

One might say that a micro-projector is the answer to these problems, but it has its disadvantages, among which are initial expense and room requirements. For the teacher whose department has a rather limited budget, color photography would be the one answer to his problems.

To use full-color film, one must have a fairly good 35 mm. still camera. Removable lenses are valuable but not absolutely essential. The film varies in price, but the Eastman Kodak Company retails 35 mm. color film under the trade name of Kodachrome at $2.50 for 18 exposures. This price includes processing and the making of the frames into 2″ × 2″ slides for projection.

The next requirement is some prepared microscope slides stained in good colors. Slides stained with safranin "O," eosin, malachite green, Bismarck brown, or combinations of these same colors make excellent photographic subjects.

If one has a reflex camera it is not necessary to predetermine if the microscope is in focus for both the eye and

[1] *The Still Camera in Biological Presentations,* March, 1939.

camera at the same adjustment. However, if a reflex type camera is not available, the following method can be used to determine the exact point at which the camera and microscope are in focus. First, focus the microscope with the eye, using the low power objective and either a 6× or 10× eye piece. Next, remove the film from the camera and arrange a ring stand and clamps to hold the camera. Remove the back of the camera and put a piece of ground glass with the frosted side down in the exact film plane. Set the shutter on time and open. Place the camera over the microscope so that the lens is within one-eighth of an inch or less from the eye piece of the microscope.

The joint between the microscope and camera must be made light-tight. The camera used in our laboratory fitted perfectly over the ocular so that no other joint was needed. However, a pill box with a hole cut in the lid to fit the camera lens and a hole cut in the bottom to fit over the tube of the microscope makes an excellent joint when one is necessary. Now, when the camera is put on the microscope, the lid is put on the pill box, and a light-tight joint is the result.

It seems to make no difference whether the camera lens is set at infinity or at the closest point. By looking on the ground glass and not through it, one will see the image of slide. If the image is not clear and sharp it can be made so by means of the fine adjustment of the microscope. The number of turns of this adjustment necessary to make the image sharp on the ground glass can be counted and recorded for reference later. If the lenses of the camera are removable, they should be taken out as the image has a tendency to be distorted after being taken through the camera lens and when projected to large sizes. It is necessary to use strong light through the microscope in order to make the image sufficiently bright to photograph. Our set-up consisted of a 2″×2″ slide projector with a 100 watt globe and 4″ focal length lens. This equipment was put about 12 inches from the microscope and reflected through the microscope by the use of the concave reflecting mirror (See Figure).

Camera Set Up for Taking Color Photomicrographs.

After the camera and the microscope have been focused and the light placed properly, remove the camera and put the film in.

Next comes the problem of exposure, as it is only with proper exposure that correct color rendition can be obtained. We found, after much experimentation, that an extinction type meter which fits over the eye piece of the microscope was by far the best.

The exposures given on the meter are intended for use with reflected light. Since the camera-microscope set-up makes use of transmitted light, these ex-

posures are not satisfactory and must be adjusted to meet the different light conditions. We found that a definite ratio exists between the meter readings and the exposures worked out for our equipment, and that once this ratio is determined for film of one speed it can be applied as well to film of any other speed.

In order to save the more expensive color film it is advisable to try out the exposure on black and white film.

The method of finding the ratio between the meter readings and the correct exposure is as follows: first, find the speed rating of the film as given by the manufacturer of the meter; next, take the meter reading and determine the proper exposure of the film under tungsten light; without changing the set-up in any way, make a series of 10 exposures using the same F. stop in all, but varying the shutter speed from 1/200 second to 1 second, recording each exposure and the film number for reference; choose the best of these exposures and compare the shutter speed used with that indicated on the meter. This ratio can now be used to find the correct exposure of any type film, the speed rating of which is given by the manufacturer of the meter. It is advisable to check the ratio determined in the above manner by taking a series of negatives of different objects before using the color film.

One may now take the picture at the predetermined exposure, advance the film to the next frame, insert a new microscope slide, and focus the microscope with the eye and make the correction necessary for the camera as determined with the ground glass.

It was found in our work that only very thin sections—3 microns or less—should be photographed under high power, and none should be taken using the oil immersion objective. The best results were obtained by using sections of about 7 microns thickness, stained with at least two different stains, and photographed through 10× ocular and the low power objectives.

After the film has been processed, the resulting slide may be used for several years. It may be projected at any time if a daylight screen is used. Later, if equipment is available, each student will be able to find and recognize under his own microscope what he has previously been shown on the screen.

I dare say that not one of my biology students will ever forget what an annual ring is after having seen it in a slide projected in full color on a screen and having participated in a discussion of cells and cell growth. Neither will he ever forget that certain woods have certain typical cell structure which relate directly to their strength and desirability for different uses after he has seen these points illustrated in color.

I believe everyone will agree that microscopic study, while in some cases not necessary, is always a definite motivating force. What child is not interested in seeing things which are invisible to the naked eye? The problem then is to direct this study in the proper channels. By first showing the students what they are expected to see, leading a discussion on the topic, and then letting them make their own microscopic study, the instructor knows that the students are seeing what he wants them to see and are getting the most out of the material. If it is deemed advisable, the students may make their own study first and later be shown the projected image of what they have seen. This latter method, of course, does away with any chance the students may have of not studying the material carefully.

# The Endocrine Glands

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A gland is an organ which takes something from the blood or other circulating medium and manufactures therefrom a secretion which it delivers to the body as needed. Roughly there are two kinds of glands: those which deliver their secretion through ducts or tubes and those whose secretion is picked up directly by the blood or lymph as it circulates through the gland. The latter are know as ductless or endocrine glands. There are about a dozen of these in the human body.

References to the endocrine glands and their disorders now appear in popular literature so frequently that it seems likely the well-informed person will shortly wish to have some accurate information regarding them. In the following paragraphs each of these glands is briefly discussed. They are arranged in the order of the frequency with which their disorders are encountered by the doctor.

The PITUITARY is located in a sort of bony bubble on the floor of the cranial cavity between the temples and just back of the root of the nose. It is roughly divided into three parts which have different embryological origins. The front part, or anterior lobe, is pushed upward from the part of the embryo which later becomes the pharynx. The posterior lobe, or hind part, pushes downward from the floor of the brain. There is a stem which connects it with the brain.

The anterior lobe has a wide influence in the body, being concerned particularly with growth in height, the development of the muscles, bones and reproductive system. It has also something to do with the handling of various foodstuffs. The middle and posterior lobes have to do with blood pressure, the handling of water and sugar and the excretion of urine. The whole gland in some way has to do with sleep.

Deficiency of the pituitary in early years is associated with lack of stature, which may amount to dwarfism when it is severe, or merely to a less than average height when it is less severe. There may be lack of sexual development. It is thought that deficiency of the posterior lobe in such persons leads also to marked obesity.

Tumors of the pituitary are associated many times with overactivity of this gland. If this occurs in early years the stature is apt to be more than normal and may amount to that of a giant. If it occurs in later years after growth has been completed, a condition known as acromegaly results. The brows become beetling and overhanging, the soft tissues of the face are increased in amount, the lower jaw becomes undershot and the chin protrudes, and the hands and feet enlarge markedly.

The THYROID is located in the neck, sitting astride the windpipe much like a saddle. It has been likened to the draft of a furnace or the ignition system of an automobile. No cell in the body reaches a stage of physiological completeness without an adequate amount of thyroid secretion.

Goiter is enlargement of the thyroid. There are many varieties of goiter, which may not be associated with overactivity or hyperthyroidism. One variety known as exophthalmic goiter leads to a pop-

eyed appearance, marked nervousness, rapid heart action and loss of weight.

The opposite condition is associated with marked retardation of physical and mental processes. If it is present at or shortly after birth the condition of cretinism results. Such a youngster is short, swaybacked, potbellied with rough, dry skin and a large tongue which often protrudes from a mouth constantly drooling saliva. The hair is sparse, dry and brittle. Victims of this disorder are mentally deficient and unless treatment is begun promptly and carried out over a long period of years they never attain a normal mentality. Lesser degrees of hypothroidism occur in adults. Its most severe form is known as myxedema. These people take on weight and become sluggish both mentally and physically. They also become very sensitive to cold. The skin is dry and chaps very badly in cold weather. The pulse rate is slow. These persons seldom perspire.

There are two ADRENALS. One is located on the upper pole of each kidney. Their combined weight is about one ounce. They are divided into two parts, an outer, cortex, and an inner, medulla, which differ embryologically and functionally. They have to do with blood pressure, with the metabolism of sugar, salt and water, with the clotting power of the blood and its distribution throughout the body.

At one time Dr. Cannon proposed the emergency or fright-flight-or-fight theory. That is, under ordinary quiet existence the adrenals put out very little secretion but under the influence of an emergency, large amounts of their secretion are thrown into the blood stream, so that the animal is put into the best possible condition to meet emergencies.

Destruction of the cortex is responsible for a condition called Addison's disease, after the English physician who described it nearly a century ago. It is characterized by extreme weakness, and a brownish discoloration of the skin; formerly Addison's disease terminated in death, which was shortly preceded by nausea, vomiting, extremely rapid loss of weight and profound weakness. In recent years we have had an extract of the cortex which maintains these sufferers in comparative comfort. Quite recently we have a synthetic compound, desoxycoritcosterone acetate, which sometimes will maintain them in comparative comfort.

A tumor of the cortex occurring in a child leads to precocious sexual development. If it occurs in an adult woman, it causes obliteration of feminine characteristics and their replacement by masculine tendencies. That is, the woman may become bald, grow a beard, develop muscular strength and the bass voice of the male. After the surgeon removes this tumor she loses her beard and regains her hair and becomes once more quite ladylike.

The GONADS are the sex glands. In addition to their well known relation to reproduction, they have other influences. They have something to do with preventing an abnormal growth in height, with the quality of the skin and teeth, with the correct growth of hair and with the state of mind. That is, the male lacking gonodal function is apt to lack normal male characteristics such as aggressiveness. The woman lacking normal ovarian function is apt to be a rather sour, egocentric, cold-blooded, person whose complexion and disposition leave much to be desired.

The PANCREAS, or sweetbread, is a large organ lying across the upper part of the abdomen. It makes an external secretion, the pancreatic juice, and an inter-

nal secretion, insulin. The latter is very influential in the metabolism of sugar and starch. It is a shortage of the internal secretion which is associated with diabetes mellitus.

The PARATHYROIDS are usually four in number. Each is about the size of a grain of wheat. They are located just below and back of the thyroid and very close to it. In early years the surgeon sometimes removed one or more parathyroids when he took out a goiter.

Their most important function appears to be the control of calcium metabolism. If they fail to function adequately the calcium in the blood falls to a very low level, the person becomes very nervous, apprehensive, and may be troubled with frequent and painful muscular cramps. The condition is known as tetany. Not infrequently the development of cataracts leads to blindness.

If the parathyroids are overactive, the calcium in the blood rises to a high level, large amounts of it are excreted in the urine and too much of it is removed from the bones so that they become fragile and break easily. This condition is usually associated with a tumor of one or more of these glands and may be corrected wholly or in part by removal of the tumor.

The THYMUS lies in the lower part of the neck and upper part of the chest. It is usually largest in childhood. If it is abnormally large it is thought to be associated with croup, frequent colds and choking spells, and babies with large thymus glands may be liable to sudden death under any unusual strain such as the anesthetic necessary for the removal of tonsils or similar operations. Pediatricians are not all agreed that this is true and some of them feel that a large thymus may cause little or no trouble. It can be reduced in size by appropriate x-ray therapy.

Dr. Hanson made an extract of thymus which Rowntree injected into succeeding generations of rats, thereby producing marked acceleration in growth and development.

The PINEAL is located in the upper and back part of the head. Originally it was thought to have something to do with the soul, and to bear some relation to the reptilian mid-eye of our ancestors. It does have something to do with the development of the body and its sexual apparatus.

With an extract of it prepared by Dr. Hanson, Rowntree was able to produce what are known as precocious dwarfs in animals. Development occurred early but growth was retarded.

Certain tumors occurring in children are associated with precocious development of the body and sex organs so that a youngster four years of age may have a development equal to that of a normal child of twelve.

The most obvious effects of disturbances of endocrine function are as follows: abnormalities of growth and development, obesity, mental retardation, failure of a student to maintain his or her previous level of scholarship, inability to get along well with other people.

Some endocrine disorders and their results can be largely overcome by proper treatment. This consists in the administration of glandular products. These are given by mouth or injected hypodermically.

Those who are interested in this subject will find it more fully discussed in the books,

*What We Are and Why,* by Mayers and Welton, and

*The Tides of Life,* by Hoskins.

## REPORT OF 1940 ELECTION COMMITTEE

The following is the result of the balloting of The National Association of Biology Teachers for offices for 1940–1941. There were 398 ballots returned.

The counting of the ballots and the compiling of the results was in the hands of a committee headed by Miss Cecilia Berlizheimer of Lane Technical High School, Chicago.

For President-elect: Mr. Homer A. Stephens, Ingalls Junior-Senior High School, Atchison, Kansas, received 273 votes; Mr. Willis W. Collins, Idabel High School, Idabel, Oklahoma, received 118 votes.

For First Vice President: Miss Helen Trowbridge, Glenbard High School, Glen Ellyn, Illinois, received 244 votes; Miss Edith Kraeft, Public Schools, Los Angeles, California, received 154 votes.

For Second Vice President: Mr. Robert L. Black, Emmerich Manual Training High School, Indianapolis, Indiana, received 171 votes; Mr. M. A. Russell, Highland Park High School, Highland Park, Michigan, received 219 votes.

For Secretary-Treasurer: Mr. P. K. Houdek, Township High School, Robinson, Illinois, received 398 votes.

As a result of the balloting the official list of officers for the coming year, 1940–1941, will be as follows:

President, Dr. George W. Jeffers, State Teachers College, Farmville, Virginia. (According to regulatory proceedings of the association the President-elect becomes President the following year after election to the former office.)

President-elect, Mr. Homer A. Stephens, Ingalls Junior-Senior High School, Atchison, Kansas.

First Vice President, Miss Helen Trowbridge, Glenbard High School, Glen Ellyn, Illinois.

Second Vice President, Mr. M. A. Russell, Highland Park High School, Highland Park, Michigan.

Secretary-Treasurer, Mr. P. K. Houdek, Township High School, Robinson, Illinois.

The ballots for the election of officers for 1940–1941 have been placed on file with other permanent records of the association in the office of the secretary-treasurer.

M. C. Lichtenwalter,
*Chairman of the Election Committee, 1940–1941.*

April 16, 1940.

## OUR NEW OFFICERS 1940-1941

Before the appearance of the next issue of The American Biology Teacher, in October, our new officers will have taken up their duties for the year 1940–1941. On behalf of the members of the Association we extend our sincere congratulations and best wishes. To our retiring officers—thanks and appreciation of their efficient services during the past year.

Our new President, Dr. George William Jeffers, is Professor of Biology and Head of the Department of Biology, State Teachers College, Farmville, Virginia. He was born in Freshwater, Newfoundland, 1897. He holds the following degrees: S.B., Boston University, 1924, A.M., 1925; Ph.D., University of Toronto, 1931. From 1925 to 1926 he was Demonstrator in Comparative Anatomy, University of Toronto; he has held his present position since 1926. Professor Jeffers is a member of the Virginia Academy of Sciences; a fellow of the American Association for the Advancement of Science; and a member of the American Association of University Professors. Aside from teaching, his special interest is in marine biology; his chief researches have been on the life histories of marine fishes.

Biographical sketches of the other officers were printed in the February number of The American Biology Teacher. Under the able leadership which our organization continues to enjoy, all things point to the steady growth and increasing influence of *The National Association of Biology Teachers*.

## PRESIDENT'S MESSAGE

It scarcely seems possible that the second year of our National Association of Biology Teachers is drawing to a close and with it my term as your President. Busy years pass quickly and this year has certainly been a busy one for our association.

At the beginning of the year we were still looking for someone to relieve I. Alexander Herskowitz, who had been doing such a splendid piece of work as acting-editor-in-chief. It was a difficult task to find a man with the necessary educational background, editorial and writing experience and the time to give to such an exacting task.

In the selection of Dr. Edward C. Colin as editor, the Executive Board feels that it has been exceptionally fortunate. Dr. Colin began teaching in small high schools in western Kansas; he has taught in one of the largest high schools in Chicago, at the Crane and Wilson Junior Colleges of that city and is now teaching at the Chicago Teachers College. His viewpoint is that of both the class-room teacher, dealing directly with biology classes, and that of the college teacher with his knowledge of pedagogical principles.

The Association has elected Mr. I. Alexander Herskowitz to the Advisory Staff of the Journal, where he will be able to give us the benefit of his experience and proven ability. We shall always be grateful to him for his fine work in starting us off and seeing us through our first year. Mr. Herskowitz is at present the Chairman of the Biology Department of the Christopher Columbus High School of New York City.

We wish to extend our appreciation to our Associate Editors for their splendid work through the year and particularly to Dr. Elwood Heiss for his cooperation and willingness to step in, if called upon, in spite of his heavy duties.

The second annual meeting at Columbus, Ohio, on December 29th, in connection with the meeting of the A.A.A.S., was an outstanding success. Dr. Miller of Ohio State University was in charge of our entertainment and the University was a most gracious host. The dinner-meeting was addressed by Dr. William Weston of Harvard and Dr. E. G. Conklin of Princeton. One of the greatest thrills of the week was to meet you, our fellow-members, who came from all over the country, from New Hampshire to Kansas and from Virginia to Toronto, Canada.

Dr. George W. Jeffers of Farmville, Virginia, State Teachers College will become the new president in the fall. I cannot wish for him anything better than the loyal cooperation which I have received from the Executive Board. With such an efficient, untiring Secretary-Treasurer as Mr. Houdek and a Business Manager like Mr. Fried, there is no reason why our association should not go on making itself felt as a factor in the educational life of our country. We do need in addition to efficient officers the hearty cooperation of each and every member of our association. A dynamic association grows, and I hope that it will be the aim of each and every one of you to add at least one new member to our group. We hope to see a permanent and useful structure rise on the foundation which we have laid.

Malcolm D. Campbell.

# Some Comments on Vitamin $B_1$

J. FISHER STANFIELD
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## INTRODUCTION

The claims advanced by certain popular journals as to the results achieved with the use of the vitamin $B_1$ complex on plants has led to much speculation relative to its true practical worth. Many have referred to these claims as "exaggerated" since they were not (with few exceptions) published in professional journals and were not presented with objective data resulting from exact, controlled experimentation. A survey of the botanical literature will reveal a dearth of quantitative results which present the exact reactions of flowering plants to this $B_1$ complex. We thus have had much general experimentation and many statements by individuals claiming somewhat fantastic results but no objective data are given. The work is obviously in a swiftly changing state of flux, and confusion is inevitable. The present wave of popularity will doubtless be followed by a deflation, but this will be followed, in turn, by a definite plateau of utilization born of the efforts of serious growers and professional experimenters.

According to the generally accepted concept, vitamin $B_1$ is a root growth substance, or hormone, that is produced naturally in the leaves of most plants. It is transported from there to the roots where it stimulates the growth by increasing cell division in the meristematic tissues. Most plants do not have sufficient $B_1$ to develop the best root systems possible. Thus the addition of this vital growth hormone results in the development of a much more elaborate root system; this, in turn, brings more vigorous growth due to the increased absorption of water and essential nutrients plus certain general physiological reactions. As a result of these actions, larger leaves and more of them are produced. These leaves synthesize more $B_1$ and in this fashion a truly healthy, normal, and sturdy plant is developed. Some authors state that $B_1$ stimulates the growth of stems and leaves as well as roots.

For the reasons outlined above, the positive results obtained with the use of $B_1$ are not transitory but permanent, and it naturally follows that increased vegetative growth in the process of maturation will bring more luxuriant flowers and fruits due to perfectly normal causes in the development of the plants. Vitamin $B_1$ does not operate as a food or as a mineral nutrient; it does operate, however, in such a fashion that certain elements present in trace amounts function more effectively. Results privately communicated to the author indicate that $B_1$ contributes a vital, positive force during the blooming period although it may not be obvious in the period between the first surge of new growth in the early stages and the flowering stage. Vitamin $B_1$ cannot perform miracles; one must allow some weeks for the full effect of its continued use.

Not all plants respond to $B_1$; tomatoes, corn, wheat, and garden peas are in this category and others will be reported in due time. The plants mentioned have a sufficient supply of this hormone and for this reason do not react. The majority

of plants, however, are deficient and the addition of $B_1$ will evince a positive growth response.

While some may doubt the efficacy of this valuable agent under all conditions of growth there is obviously no experimental factor of more interest to an alert botanist nor one of more timely application for interested students. The fact that vitamin $B_1$ evinces a growth response in most plants is not questioned; the degree and the type of response varies widely, however, and is a controversial subject.

Vitamin $B_1$ is a tool of countless applications and is well within the resources of any laboratory or the limitations of the average purse. These two factors: no elaborate apparatus and no great expense, serve to make $B_1$ the most popular and challenging project material that has come to the attention of the writer in late years. It is an excellent tool for growth experiments under any conditions.

### The Active Agent

No instructor is unfamiliar with the various products so commonly advertised in the periodicals today. Tablets, pure crystals, stable solutions, fertilizer combinations, and even yeast may be used for growth experiments. A casual examination of leading garden magazines will provide ample inspiration for the purchase of these products in any of the varied forms.

A concentration of one part of crystalline vitamin $B_1$ to 100,000,000 parts of water is recommended for general use. This concentration may be used freely; it has been used at weekly, three-day, and two-day intervals by various experimenters with good results. While over dosage may do no harm it is wasteful and serves no practical end due to the lack of utilization by the plant or to its disintegration in the soil. Application of this concentration twice weekly should be ample for general purposes. Stronger solutions such as 1 : 10,000,000 are often used where heavy dosage is required; for example, in mitigating the shock of transplanting. In this case vitamin C as well as rooting hormones are often used in addition to the $B_1$ and have been found useful.

The type of experiment and the training of the experimenter will determine the form of the vitamin to be used. Crystalline $B_1$ is obtainable from supply houses and is to be preferred for exact work. It may also be obtained in the tablet form with an inert carrier, each tablet containing an exact dosage of the vitamin. The liquid forms on the market are quite accurate but controlled experiments would require some knowledge of the chemical nature of the solvent; for general purposes this information would not be required. The writer has found the tablet form more convenient and accurate although many prefer to weigh out the crystals on an analytical balance. Common yeast may be used but would obviously offer no definite control of the dosage. Dried brewers yeast as well as compressed yeast is utilized. There are also products on the market in tablet form that contain fertilizer elements as well as the crystalline $B_1$; this naturally increases the number of factors to be considered in the results. Full information may be obtained by writing the manufacturers or distributors and by reading the pamphlets available. The editor will furnish a list of available forms of $B_1$ upon request. The bibliography will give further suggestions in general.

### Experimentation

A plant is the product of all the environmental factors plus its inherent

tendencies. We must accordingly bear this in mind in the interpretation of experimental results. Consider carefully the growth factors and utilize every possible control. These controls are a prime necessity and sufficient numbers of test plants are essential for the validation of results obtained. In many cases, such procedures involve careful observation rather than profound technical knowledge. One does not need to be a highly trained technician to work successfully with $B_1$ in its general aspects since the results are quite definite, in most cases, if they are at all positive. The headings given below are presented to provide suggestive material for experimental approaches in the biological laboratory.

*Germination of seeds and growth of seedlings*

Early development of a root system is of paramount importance to the plant. Does $B_1$ aid in this process? Does the soaking of seeds in a solution of this vitamin aid in their germination? Variation in different seeds? What responses are noted in the young plants? Would watering with $B_1$ be beneficial in the growth of a new lawn? Would it help an established lawn?

*Transplanting shock*

Does soaking for an hour or longer in a 1:10,000,000 solution of $B_1$ and then a "watering in" with this same solution minimize the shock of transplanting? Do all plants respond? Is it of sufficient value in transplanting potted stock to justify its use? Try it on shrubs out-of-doors and the regular gardening plants. Does it help in transplanting trees? Will it help "sick" plants to recover? Is it worth while to use it on all plants set out in the spring season? Will it save transplants in the hot summer season?

*Ecological factors*

Does $B_1$ improve growth in poor soils? Does the addition of humus to the soil change the response of the plant? Does increased dosage bring a more marked response? Is temperature a factor? Does the acidity of the soil change the reaction? Does pre-treatment with $B_1$ enable a plant to survive drouth conditions? Try this on the common ivy. Does $B_1$ enable a fern to better survive in the low humidity and the dim light of the average home? Does $B_1$ (as stated by one advertiser) actually help a plant to utilize low light intensities more efficiently? Is there a difference of response when plants are grown in sand with nutrients? In water (chemiculture)? In soil? For the more serious worker a series of experiments which include photoperiodic responses would be of interest. If "long day" plants show a higher $B_1$ content (it is said that they do), how is this reflected in the general response of the plant under such conditions? Are the root systems under "long day" and "short day" any under "long day" and "short day" similar? Do treated plants absorb more water?

*Rooting of cuttings*

Is this vitamin of value in the rooting of cuttings? Does a weekly watering increase rooting? Does the addition of a 2% cane sugar solution bring any reaction? If rooting compounds are used, is additional $B_1$ beneficial? Does a preliminary soaking in $B_1$ aid in rooting? In one case Tradescantia developed more adventitious roots in a $B_1$ solution than in water but a small amount of cane sugar was present. Was this a factor?

*Water plants*

It has been reported that Elodea contains ample $B_1$. How do other submerged

plants react? How do the common algae respond? Water ferns? Floating types of plants? It has been suggested that $B_1$ should serve a useful end in chemiculture. Just what effect does it have on the root development? Is there a better growth in general? What concentrations should be used? A series of small set-ups could be used here.

*Flowering*

It has been found that this vitamin does appear to have some effect upon flowering. Easter lilies treated at weekly intervals produced much larger flowers than did untreated plants, and also grew faster. In general, does it speed up the flowering process? Granting that $B_1$ has nothing to do with the formation of the flower primordia this subject, nevertheless, offers possibilities. Do seeds from treated plants produce better seedlings? Is there any relation between root growth, pot binding, and flowering in potted plants? Will cut flowers last longer in a $B_1$ solution?

*Quantitative measurements*

It has been stated by professional workers that treatment with $B_1$ has resulted in an increase of 100% in the leaf surface and a 300% increase in the dry weight of the tops of some plants. Two grasses showed a 500% increase in dry weight over that of the controls in an eight-week test. These plants were grown in sand with nutrients added; what results would you get when using common garden soil. What about fresh weight? How does root growth compare with the above-ground increases noted above? Can you determine differences in storage materials in treated and untreated plants? This might be rather involved but a simple series would be feasible in some cases. At any rate, fresh weight, dry weight, and leaf surface can easily be tested and compared. Transpiration rate could also be compared by simple weight tests on sealed-in plants. Vary the dosage and note any results in a series of the same plant. Any effects of over-dosage?

*Varietal variations*

What genera or species respond in the most striking fashion? What forms are particularly useful for laboratory work? Garden magazines in particular have listed many plants as responding. Can you check these reports; i.e., duplicate the results obtained by them? Do all ferns respond in a positive fashion? What common house plants are good experimental material? Does treatment with $B_1$ enable a plant to better survive the dark months of midwinter? Do not expect too much; plants have a rest period in nature and do not respond strikingly in some seasons. Pothos, a common house plant, has been found to react favorably to weekly dosage; what are your results?

Grape ivy, Hydrangea, *Uinca rosea*, Torenia, Cineraria, and Cosmos are a few forms that have shown a positive response to $B_1$. A test on common garden plants would hold interest; this would be true, in particular, in the critical early stages.

*Community service*

Through the medium of project work and a study of commonly used plants in the community a definite service is rendered by careful experimentation. Any interested student can easily arrange a practical and effective project that will yield tangible results. The local garden club or horticultural society would welcome cooperation and discussions. The average grower is anxious to have some definite, quantitative data upon which to base his work. Investi-

gate the different forms in which $B_1$ is marketed; obtain information relative to the exact amount of the vitamin that is in the product and know just what you are purchasing. Pure crystalline $B_1$ costs about six dollars per gram at any supply house; for larger amounts it is advisable to get a quotation since lower prices would probably prevail.

One gram of $B_1$ will make thousands of liters of the dilute solution recommended for general use; the only difficulty is the exact measurement and the weighing of the material for controlled work. Of course, approximations can easily be arranged. Full details cannot be given here but a careful study relative to the use of this vitamin will yield dividends in experimentation. Make it a point to collect all bulletins available on the subject; in other words, keep a complete file of pertinent, contemporary references applicable to your own work.

## Conclusion

In a paper of this type it is obviously impossible to give more than a hasty and kaleidoscopic treatment of a subject which is yet in a developmental stage as far as practical application is concerned. For this reason a short, usable bibliography is included for those interested in further general study. This is by no means complete but should serve the purpose. No mention has been made of the other components of the $B_1$ complex that may be utilized, but these will be found described in the literature listed. Further development may be expected, with new growth substances announced in the near future. The prohibitive cost of most of these new items makes their general use impracticable in most cases.

Thus the subject of vitamin $B_1$ is timely, interest is at a high pitch, extreme results have been reported, controversial data have been presented, many products are on the market with their claims, the experimental laboratories are seeking quantitative data, a new field of research rich in its promise and connotations lies before us, a new tool is placed in the hands of the creative botanists and other biologists—the opportunities are legion. It is hardly possible that the instructors in secondary schools will overlook such an effective instrument.

## Bibliography


1. Adams, W. and Logan, N. B. America reports on vitamin $B_1$. Better Homes and Gardens. February, 1940.
2. Bonner, J. The rôle of vitamins in plant development. Botanical Review 3: 616–640. 1937.
3. ———. The hormones and vitamins of plant growth. The Scientific Monthly 57: 439–448. 1938.
4. ——— and Greene, J. Vitamin $B_1$ and the growth of green plants. Botanical Gazette 100: 226–237. 1938.
5. ——— and ———. Further experiments on the relation of vitamin $B_1$ to the growth of plants. Botanical Gazette 101; 491–499. 1939.
6. Bonner, David M. and Bonner, J. On the influence of various growth factors on the growth of green plants. American Journal of Botany 27: 38–42. 1940.
7. Logan, H. B. News of an exciting discovery. Better Homes and Gardens. October, 1939.
8. Stanfield, J. Fisher. Plant Hormones. Turtox News 18: 24–25. 1940.
9. Thone, Frank. Science stunts for the gardener. Science News Letter 37: 234–236. 1940.

## LABORATORY AND TEACHING AIDS

With the present-day heavy enrollment in biology classes, it becomes increasingly difficult for a high school teacher with limited time, equipment, and funds to provide individual experiments and demonstrations by which pupils may see living things function. At best, charts, models, and pictures are but supplements to the observation of living things. Another difficulty is the semester system. Because of this arrangement it is frequently necessary for the teacher to provide material twice a year for the same units of work. Such material is not always available. Resourcefulness may offset to some extent these difficulties. The following devices have been very valuable to me, and I offer them as suggestions to those who may find them profitable.

1. To demonstrate bread mold structure, growth and reproduction, I find that a culture may be carried from year to year by simply covering a jar containing a piece of bread on which mold is growing and setting it away in a dark place. Several months later, when needed, the culture will have developed numerous zygospores. Some of these may be mounted directly in gum damar on a glass slide under a cover slip. They furnish permanent slides. Others may be "planted" in moist bread and left in a dark place for a few days. The result will be a rich growth of *Rhizopus nigricans*.

2. In the fall when twigs are collected for winter bud study, several should be put aside for use in the spring months, at which time the trees are sprouting leaves. To prevent drying and shriveling each twig should be covered with a coating of shellac or clear varnish. The buds, leaf scars, lenticels, etc., are perfectly preserved. In the spring, leaves may be pressed and preserved for winter use with or without a coating of varnish.

3. Individual sets for studying stages in seed germination may be prepared by lining mayonnaise jars with blotting paper on which a line has been drawn to represent the ground surface. The blotting paper is then moistened and several seeds inserted below the "ground line" and between the blotting paper and the glass. By placing a little water in the bottom of the jar from time to time the paper is kept moist so that the seeds soon germinate. Their development may be watched daily.

4. To teach osmosis, first demonstrate diffusion by dropping a few crystals of potassium permanganate in a flask of water. Because of the purple color of the crystals diffusion is easily observed by all pupils. It is only a step further to show that osmosis is diffusion through a membrane by placing dried raisins or prunes in a dish of water. The next day diffusion of the water through a membrane (fruit skin) is seen by the swelling of the fruit. Diffusion of pulp through the membrane is evidenced by the coloring of the water which may be tested with Fehling's solution for the presence of sugar.

5. Paramecium cultures are easily carried a number of years by supplying several grains of boiled wheat and a piece of suet the size of a small pea to the culture at the close of school in June. If water is necessary add filtered aquarium water. In the fall the animals are starved; but within a week after more boiled wheat is added, they become plump, numerous, and active. My present culture has been maintained for the past three years in this way. The culture dishes are the kind that can be stacked one above the other thus pre-

venting undue evaporation of water. Any biological supply house will furnish them for a small sum.

6. To supply frogs, newts, and pitcher plants with insects, expose a piece of fruit such as an apple or a banana for two or three days in an open jar. Then cover the jar. In about ten days there will be an adequate supply of fruit flies from the eggs deposited when the jar was exposed. These insects are forced into the terrarium under the glass cover through a paper funnel, the large end being placed over the fruit jar opening.

7. To illustrate how the basal end of Hydra and the tube feet of a starfish attach to surfaces, nothing is better than one of the rubber suction disks used by motorists and housewives to attach objects to walls without the use of nails. These disks are on sale in the five and ten cent stores.

When simple devices and techniques are used wherever possible, pupils are motivated to try additional experiments in school and at home. They see that elaborate equipment is neither essential for all scientific observation nor prerequisite to an understanding of scientific principles.

MADELINE N. HERBERT,
*Dunbar High School,
Washington, D. C.*



## AN OPPORTUNITY FOR STUDENTS OF HEREDITY

The contributions of the science of genetics with its revelations concerning the mechanism of inheritance represent one of the major developments in the field of biology during the first four decades of the present century. Although during this period the principles of Mendelian inheritance have been clearly defined, and the chromosomal basis of the transmission of hereditary characters definitely established, such fundamental problems as the nature of the gene itself, and the process it plays in development continue as foci for the concerted study of many present-day geneticists.

It is our personal experience that there are many intellectually active students who are anxious to initiate steps leading to eventual participation in such a research program, but who lack specific information concerning methods of approach. For some time the Carnegie Institution of Washington has been interested in the possibility of making available certain of the facilities of its Department of Genetics for the use of such students, and student groups, such as biology clubs. It has been felt that an experimental approach to the subject of heredity—at first in all probability for the verification of established principles—will help toward a better understanding of the fundamental laws of heredity, and may lead subsequently to the collection of data applicable to the solution of problems of the type indicated above.

Various materials, both plant and animal, have been considered as serviceable for an introduction to genetic work, but probably none surpasses the little vinegar-fly, *Drosophila melanogaster*, whose study has contributed greatly to the foundations of modern genetics. For the purposes we have outlined here, *Drosophila* offers the advantage of a short life cycle (about two weeks at room temperature) so that numerous generations are procurable in the course of an academic year. Numerous stocks are available by means of which the inheritance of a wide array of visible characters can be studied without the need of any expensive equipment other than a good hand lens or a low power dissection microscope. Despite their small size (*Drosophila* adults measure about two millimeters in length), these flies possess in the salivary glands of their larval stages chromosomes that are among the largest known, and the study of these chromosomes is playing an increasingly important part in the analysis of many current problems.

The Department of Genetics of the Carnegie Institution of Washington located at

Cold Spring Harbor, Long Island, New York, is prepared to offer, therefore, from its extensive collection of stocks of *Drosophila melanogaster*, a limited number of representative types from which matings may be made to demonstrate the principles of inheritance. First shipments, which will be sent without charge, will include stocks from which monohybrid and dihybrid ratios may be calculated. Other material will also be available with which experiments could be made demonstrating sex linkage, dominance of mutant over wild-type, lethal effect of mutant, and simple linkage relationships. The flies will be mailed in glass vials containing a small amount of food under a permit issued by the United States Department of Agriculture. Detailed instructions concerning the care and handling of the flies will be furnished at that time, as will also the essential biological data requisite for successful completion of the experiments. It is proposed to initiate this service about September fifteenth of this year.

In order that our clerical work may be minimized, we prefer that requests reach us only from faculty leaders of the biology clubs, departmental heads or from biology teachers in those schools which are not departmentalized. Subsequently we may be able to relieve the teacher of his duty as an intermediary by communicating directly with the more advanced and capable students or student leaders of biology clubs. Correspondence containing requests should be addressed to The Drosophila Laboratory, Department of Genetics, Carnegie Institution of Washington, Cold Spring Harbor, Long Island, New York, at least one month in advance of the date on which the material is desired. It should be kept in mind that the material which will be supplied will suffice for starting stock cultures from which flies suitable to begin experiments will be available about two weeks later.

M. DEMEREC,
B. P. KAUFMANN.

# Books

FITZPATRICK, FREDERICK L. *The Control of Organisms.* Bureau of Publications, Teachers College, Columbia University, N. Y. xi + 334 pp. 1940. $2.75.

This is the third in a series of books on Science in Modern Living by Members of the Bureau of Educational Research in Science of which Professor S. R. Powers is the Administrative Officer, the two preceding volumes being *Life and Environment* by Paul B. Sears and *The Storehouse of Civilization* by C. C. Furnas.

To say that the early textbooks in secondary science were often little more than dilutions of college texts is to state the obvious. It is likewise true that some of our current textbook writers have done little more than to substitute "Unit" for the "Chapter" of the older books. In a few commendable cases the authors have really come to grips with educational theory on the one hand and the abundant variety of biologic subject matter on the other, with creditable results. A great deal of research must be done before we can have texts that will do justice to our subject.

*The Control of Organisms* is not, however, a new text in biology, but extensive research has gone into its preparation. It therefore contains much basic biology material that should prove invaluable to teachers and curriculum workers alike, if they would make biology more—I hesitate to use the word—"functional" in our rapidly changing society.

The book is the story of man's effort to suppress and dominate other living things. The author describes existing methods of subduing the organisms that cause disease as well as those that make inroads upon human economy. Running through the book is the concept of the balanced community. I like the author's restraint. While he does not fail to give the present methods of control—and he is remarkably up to date—he wishes the reader to remember that the last word has not been spoken.

Professor Fitzpatrick writes well and

the laymen will nowhere be lost in technicalities. The printing is clear and the book is well-nigh perfect mechanically. There are ample references and a good index.

There is in my opinion one serious omission and it is mentioned more as a criticism of many American Biologists than as pointing the finger at the particular work. You will hunt in vain for any reference to marine life in spite of the fact that water covers three-fourths of the globe and is inextricably intertwined with human economy. No mention is made of the organisms that prey upon oysters—and they are legion—no word about shipworms that cause such untold damage to wood in water, nor about barnacles that hamper ships; nothing about dogfish that every fisherman curses, about "stinging nettles" that interfere with our enjoyment of the beaches, etc.

In spite of this it is well-nigh an indispensable book for the biology teacher—for its sane point of view and for the wealth of material that it contains.

G. W. Jeffers

Hussey, Priscilla Butler. *A Taxonomic List of Some Plants of Economic Importance.* Science Press Printing Co., Lancaster, Pa. 45 pp. 1939. $1.00. (Distributed by the author, Louisiana State Normal College, Natchitoches, La.)

This pamphlet of 45 pages is a list of some plants arranged in taxonomic order under 8 headings indicating economic use. These headings are gums, oils, dyes, fibres, drugs, foods, timbers and miscellaneous. A short statement is given of the specific use of each plant.

The publication should be useful to anyone interested in general information on economic plants or seeking examples of plants valuable for some specific use. The value of the work would have been increased had an index to the included plants been added. This would have made possible a rapid check up on the general economic value of a certain species.

The scientific names should have been followed by the citation to the author or authors. Common names might well have beeen more consistently used.

H. D. Harrington,
*Chicago Teachers College.*

## EVALUATION OF BIOLOGY TEXTBOOKS

Have you any definite ideas on the characteristics of a good high school textbook in biology? Are you interested in improving the quality of textbooks in biology? Our Textbook Evaluation Committee, headed by Mr. Alan A. Nathans, Associate Editor, has been attempting the difficult task of making an impartial evaluation of the high school

textbooks on general biology, now on the market. In order to expedite this important work, the cooperation of numerous teachers is desired. At present, the South, the Far West, and the Middle West are not well represented on the committee. If you are interested in volunteering for this important work Mr. Nathans will be glad to hear from you.

## AN OUTDOOR BIOLOGY LABORATORY

To the Editor:

I am appealing to you as editor of The American Biology Teacher for help in a project that has fallen to my lot to develop. The School City of Elkhart has given the biology department a tract of land of about four acres to develop into "An Outdoor Biology Laboratory." If anyone else has developed such a tract or is developing one at the present time I would like to correspond with them in an exchange of ideas.

Very truly yours,
N. E. Adams,
*Head of Biology Department,*
*Elkhart High School,*
*Elkhart, Indiana.*

## CHICAGO BIOLOGY ROUND TABLE

The April meeting of the Chicago Biology Round Table was held in the Chicago Womens League Building, April fifth. The main speaker of the evening was Dr. Paul E. Belting, Assistant Superintendent of Public Instruction in Illinois. Dr. Belting is also a representative of the North Central Association of Colleges and Secondary Schools.

The speaker's paper dealt with the subject, Vocational Biology. Dr. Belting suggested that the present four year sequence of science be displaced by an introductory course in the physical sciences followed by one in the biological sciences. The last two years of science would be one of specialization pursued only by those students that could profitably continue the work. There would be a complete reorganization of the subject matter, which would influence the elementary science courses as well.

The latter part of his paper dealt with the vocational and avocational aspects of biology, especially as they apply to every day life, emphasizing the utilitarian value of these various applications.

Announcements were made concerning the annual meeting which is scheduled for May, at which time election of officers will be held. Preparations are also being made for a field trip into the Indiana Dunes area with Dr. O. D. Frank and other popular faculty members as leaders.

M. C. Lichtenwalter.

## FOR YOUR BOOKSHELF

*Parasitology.* HEGNER, ROOT, AUGUSTINE and HUFF.

This book is a revised edition of an earlier work. It is intended as a text for advanced students, and includes a great body of data which has been contributed in recent years. Although parasites of the domesticated animals and of other lower animals are discussed, chief attention is concentrated on the animal parasites of man. D. Appleton-Century Company. 1938. 812 pages. $7.00

*Viruses and Virus Diseases.* THOMAS M. RIVERS.

This recognized authority undertakes to explain and clarify various aspects of the virus diseases and their causes. Dr. Rivers discusses such questions as: What is a virus? What is a virus disease? Why are virus diseases placed in a separate group? and How are these diseases treated and prevented? Stanford University Press. 1939. 133 pages. $1.75

*Animals as Friends.* MARGARET SHAW and JAMES FISHER.

The writers are well known authorities in the field of which they write. They have compiled a wealth of up to date information in this popular styled, pleasant reading book. A fairly thoroughgoing description of the care and upbringing of many varieties of animals from the dog and goldfish to the silkworm and mongoose is presented. E. P. Dutton & Co. 1940. 271 pages. $2.50

*Modern Methods and Materials for Teaching Science.* E. D. HEISS, E. S. OBOURN, and C. W. HOFFMAN.

An up to the minute textbook that is of undoubted value to those who are preparing to teach science and to those who are already teaching. The book is divided into three main sections dealing with Principles of Science Teaching, Materials and Devices for Teaching Science and Sources of Materials for Teaching Science. A comprehensive discussion of Visual-Auditory aids is timely and important. Macmillan Company. 1940. 351 pages. $2.50

*Heredity and Social Problems.* L. L. BURLINGAME.

A biologist's successful attempt to draw closer the biological and social sciences. In addition to the excellently written chapters dealing with reproduction, Mendelism and the various types of genetic phenomena, there are included a number of unusually interesting chapters on the genetic aspects of race, war, migration, mental deficiency, medical problems, education and government. McGraw-Hill. 1940. 369 pages. $3.50

*Growing Plants in Nutrient Solutions.* W. I. TURNER and V. M. HENRY.

Designed for commercial producers and advanced amateurs. Material on plant physiology is included as a background for a later discussion on the essential elements necessary for plant growth. Various formulas for solutions are given as well as a number of practical suggestions for methods of control, types of equipment and methods of converting from soil to nutrient culture. John Wiley & Sons. 1939. 154 pages. $3.00

*Our Small Native Animals.* ROBERT SNEDIGAR.

As indicated by the title, this book is replete with accounts of the small wild animals of the United States. Numerous plates add to the interest of this charming narrative of the life, habits and idiosyncrasies of our animal life. A most valuable book for camp counselors and for teachers and students of nature. Random House. 1939. 308 pages. $2.50

*The Microscope.* R. M. ALLEN.

Just off the press comes this new book in the field of microscopy. The volume deals with the history, theory and use of the microscope. Included in the text are many photographs which trace the development of the microscope from the simple instruments of Leeuwenhoek to the many complex instruments of today. A thorough discussion of the use of accessory equipment of all types is included. D. Van Nostrand Co. 1940. 286 pages. $3.00

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# THE AMERICAN BIOLOGY TEACHER

Compiled by PHILIP GOLDSTEIN

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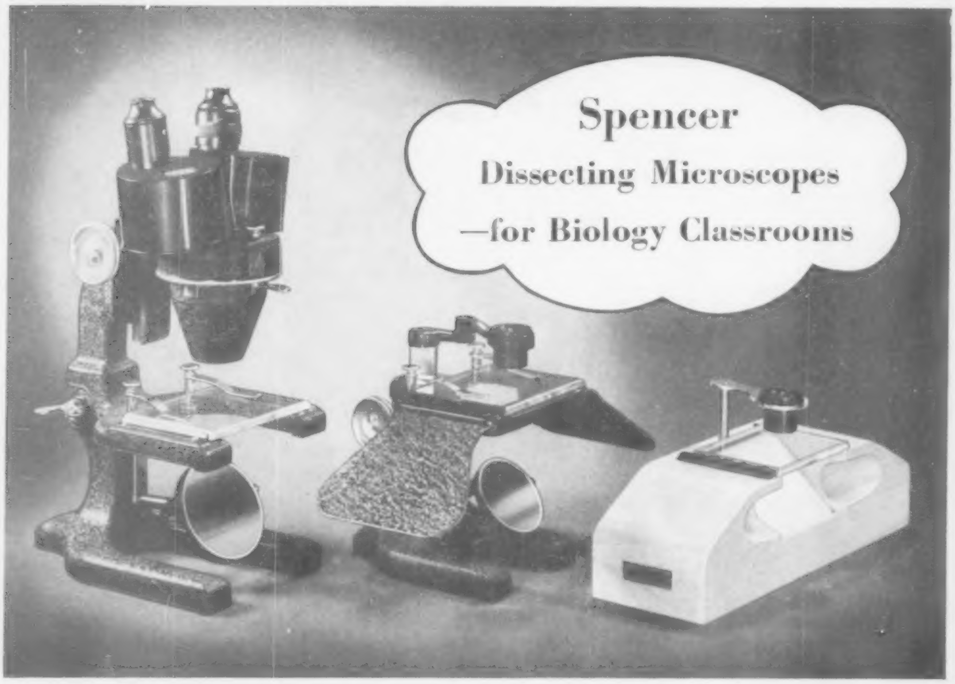


*Junior Stereoscopic Microscope* — *Dissecting Microscope No. 84* — *Dissecting Microscope No. 86*